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TAC-3290 Family Low-SWaP, Multiple Bandwidth Downconverter/Tuners

Includes single-channel (TAC-3290) and dual-channel (TAC-3294) versions

- **RF Input: 0.5—26.5 GHz (optional 44 GHz extension)**
- **IF Output: Tunable up to 4.5 GHz**
- **Selectable BW: 500, 1000 and 2000 MHz**
- **Low-SWaP form factor**
- **Search, scan and set-on ready**

The TAC-3290 product family is a SWaP-focused tuner and downconverter with selectable bandwidths supporting fast tuning for a broad spectrum of signals, enabling user operation closer to the source of the signal of interest and offering flexibility and adaptability in the field as needed. The rugged, small form factor is especially well suited to applications requiring portability, reduced footprint and unattended operation. Significant advantages offered by multiple bandwidths include adaptability of the tuner, which empowers the user to address a broad spectrum of signals, and the ability to reconfigure the device as signals of interest change. Flexibility increases compatibility and adaptability with downstream equipment, minimizing the need for frequent system upgrades and extending not only the lifetime value of the products in this family but also the variety of applications that can be addressed.

TAC-3294 dual channel shown here
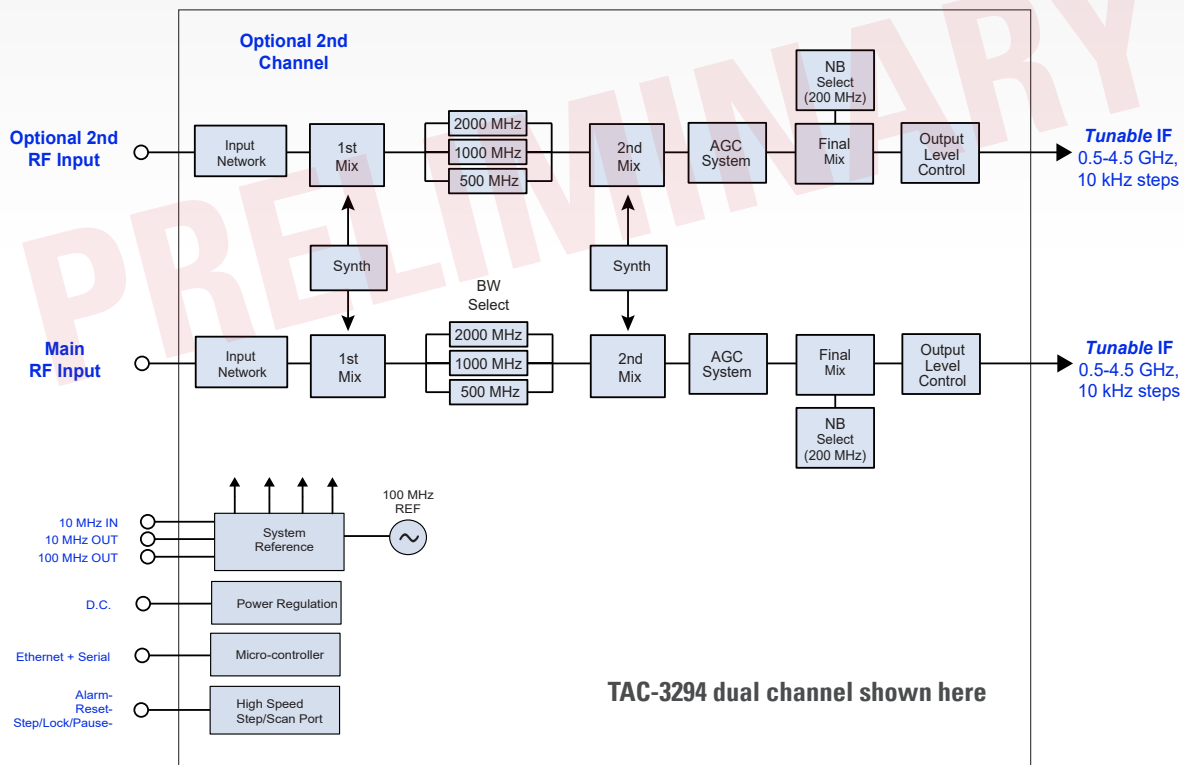
RF Input Characteristics

The TAC-3290 family addresses different input ranges based on the bandwidth in use. The table below shows input ranges of center frequencies that can be tuned for each of the bandwidths available.

RF input frequency tuning range	0.5 – 26.5 GHz (for 500MHz BW) 1.0 – 26.5 GHz (for 1000MHz BW) 1.5 – 26.5 GHz (for 2000MHz BW)
Frequency tuning resolution	10 kHz
Conversion sense	Upright for tuned frequencies up to 18.0 GHz Inverted > 18 GHz
LO re-radiation (23-44 GHz)	- 70 dBm, max
Max input level	+20 dBm

Optional RF Input Extensions

The input tuning range of the TAC-3290 family can be extended with the use of an external device called the FXTX. In use, the higher frequencies are routed into the FXTX and downconverted, with the output cabled into the RF input of the TAC-3290. Then, the single output of the TAC-3290 is used from signals from either source (base unit or extension).

Models	FXTX-35 Single Channel, FXTX-35-C Dual Channel
RF input frequency tuning range	26.5 – 44 GHz
Frequency tuning resolution	10 kHz
Conversion sense	Inverted
RF input Connector	2.4mm female
Max input level (no damage)	+20 dBm
IF output	Within the 1.5 – 26.5 GHz, depending on FXTX in use
Control	LEMO Connection, from TAC-3290
Reference	100 MHz, from TAC-3290

IF Output Characteristics

The TAC-3290 uniquely provides an IF output frequency that is fully tunable, providing the user greater control to tailor the settings in support of downstream components, such as digitizers.

Frequency tuning range	500–4500 MHz
Frequency tuning resolution	10 kHz
Output 1 dB compression point, at max gain	+10 dBm, min
Output IP3	+20 dBm, typ
Power adjustment range, at +25°C	-20 to 0 dBm, in 1 dB steps (AGC mode)
Gain adj range	10 to 50 dB, in 1 dB steps (MGC mode)
Spurious	<-60 dBc, typ
Harmonics, at +10 dBm pout	-20 dBc, typ
Image rejection	60 dB, min
Noise figure at max gain	12 dB, typ. 20 dB max

Bandwidths

Unique to the TAC-3290, user-selectable bandwidths offer the variety of throughput ranges to support ever-changing requirements and setup configurations. The values in the table below represent the off-the-shelf lineup. Additionally, bandwidths can be customized according to customer requirements at the time of order.

WB bandwidths (3 dB): selectable with full IF tuning range	500 MHz 1000 MHz 2000 MHz
NB bandwidth, with IF output fixed at 625 MHz	200 MHz

Reference and Local Oscillators

The TAC-3290 has an internal 100 MHz reference that can be phase-locked to an external 10 MHz if one is present. A sample of the 100 MHz is provided, which can be used to lock an external device. Also brought out is a sample of the 10 MHz reference for daisy-chaining purposes. This signal is either the same signal as the external reference or, when there is not an external reference, the 100 MHz signal divided by 10.

Phase noise, typ, in degrees RMS	<0.5 deg, 100 Hz to 10 MHz integrated
Internal reference frequency	100 MHz
Internal reference aging, per year	+/- 1 ppm
Internal reference stability over temp	0.1 ppm
Reference output, 100 MHz	100 MHz @ 6 dBm +/-3 dB, locked to the reference in use
Reference output, 10 MHz	10 MHz @ 6 dBm +/-3 dB, locked to the reference in use
External reference input (customer supplied)	10 MHz @ 0 dBm +/- 6 dBm +/-3 dB
Locking range of external reference	+/- 1 ppm
Reference select	Auto-select, if present
Reference input/output connectors	SMA-female

General Specifications

Operating temperature	-20 to +55°C, baseplate
Humidity	Up to 95% non-condensing
Power requirement	DC: +10-15 VDC, tbd A max (varies by configuration)
Power connector	LEMO, two conductor (prelim)
Size, inches	7H x 10D x 1.5W
Hardware reset	Externally controllable

Tuning and Control

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Communication interfaces	Ethernet and Serial RS-232
Connector	LEMO
Remote control	SCPI-type command-set and browser-based GUI
External block converter support	User offset configurable for BDC in use
SWP connections, 3v TTL lines or RS422 Differential	Trigger IN (strobe) Trigger enable (pause) All settled indicator (ready)
Tuning speed (settling times)	< 200 usec (in high speed modes) ~ 2 msec (in SCPI mode over ethernet)
Search types (see below)	SCPI-based HW triggered step/scan SW triggered step/scan HW triggered list SW triggered list
List size	Up to 1000 entries
IP parameters	Set IP Mode (DHCP/Static) Set IP address, gateway, subnet Read MAC address

Search Sweep/Scan

The TAC-3290 supports search via two modes: list mode and step/scan. Using these hardware controls, search and settling speed increases to 200 uSec. Triggered pulses are used to enable auto-scanning or single, user-actuated individual steps. Search settings can be configured using SCPI commands or the GUI.

Search Modes	Description	Programmable	Enable
Step/Scan - Manual	Triggers used to manually/externally step from start to stop based on preset step size. Dwell times determined by external control.	Start, stop, step size and direction	HW or SW trigger
Step/Scan - Auto	Trigger initiates programmed step/scan routine. Used for scans with fixed step size increments and dwell times.	Start, stop, step size, dwell time, scan direction, number of cycles	HW or SW trigger, HW pause
List Mode - Manual	Preloaded list of up to 1000 entries in RFT. Trigger used to take individual step to next entry in list. Dwell times determined by external control.	List entry, scan direction, repeat	HW or SW trigger
List Mode - Auto	Preloaded list of up to 1000 entries in RFT. Trigger used to run list. Dwell times determined by list parameters.	Start, stop, step size, dwell time(s), scan direction, repeat	HW or SW trigger, HW pause

GUI- and SCPI-Based Interfaces

The TAC-3290 has a complete SCPI-based command set accessible over a choice of Ethernet or serial ports. GUI solutions are browser-based and usable on Windows, Mac and Linux platforms.
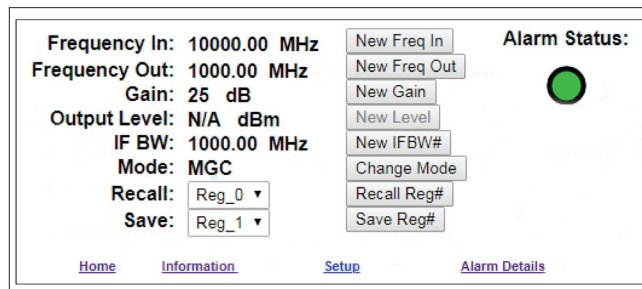
Terminal Support

In addition to the browser-based GUI, the TAC-3290 and TAC-3294 are equipped with a serial port and can support terminal communications. SCPI-based commands are "send and receive," providing another human-readable user interface.

Product Comparison: TAC-3290 vs. RFT-3290

Search Modes	TAC-3290	RFT-3290
Form factor	Low SWaP	Rackmount
Customizability	Limited	Full
Input frequency coverage	Up to 26.5 GHz (44 GHz with ext block)	Up to 40 GHz
Instantaneous BWs	Choice of three BWs	Choice of five BWs
Low-band extension?	With external extension	Yes
AGC available?	Yes	Yes
High-speed search available?	Yes	Yes
Tuning speed	200 usec	600 usec with -SWP
Temperature range	-20 to +55°C	0 to +50°C
Interfaces	100 MB Ethernet	100 MB Ethernet
Options for phase coherent tuners	Optional coherent 2nd channel	Master/slave all-in-one dual channel
Power	DC	AC

Ordering Information

Model Number	Part Number	Description
TAC-3290-18	010-02407-0001	Compact RF tuner, single channel, 0.5–18 GHz input; tunable IF output; 3 selectable BWs
TAC-3290-26	010-02407-0002	Compact RF tuner, single channel, 0.5–26.5 GHz input; tunable IF output; 3 selectable BWs
TAC-3294-C-18	010-02407-0003	Compact RF tuner, dual channel, 0.5–18 GHz input; tunable IF output; 3 selectable BWs
TAC-3294-C-26	010-02407-0004	Compact RF tuner, dual channel, 0.5–26.5 GHz input; tunable IF output; 3 selectable BWs
Options		
FXTX-35	010-02410-0001	Single channel downconverter frequency extension unit. 26.5–44 GHz input range. For TAC-3290
FXTX-35-C	010-02410-0002	Dual-channel downconverter frequency extension unit. 26.5–44 GHz input range. Dual inputs, dual outputs, shared LO. For TAC-3294

PRELIMINARY

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Contact Mercury's RF & Microwave engineering team at **rf.microwave@mrcy.com** or visit **www.mrcy.com/rf** for a detailed listing of RF and Microwave products.

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